

TRAINING PROGRAMS

for **Milk Plant Operators**

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EMPHASIS has been and is placed on the need, value, and methods of instruction of food handlers other than those concerned with milk processing. If the published literature is used as the criterion, however, not much has been done regarding the education, training, and motivation of milk plant operators and owners.

Several reasons may account for the general lack of training programs for milk plant operators. The chief reason appears to be a current trend toward considering the sanitary objectives of milk control as a *fait accompli*. Tending to negate this assumption are some recent findings. Among these are a recent paratyphoid B milkborne outbreak incriminating pasteurized milk, equipment controls, and the human factor (1); laboratory thermal resistance studies indicating that heating *Coxiella burnetii* suspended in whole raw milk for 30 minutes at 143° F. is insufficient to eliminate

all viable rickettsiae, suggesting thereby the need for tighter supervision of the pasteurization process (2); newer developments in the design and operation of high-temperature, short-time pasteurizers (3); the necessity for additional thermal resistance data on "no hold" and similar high temperature processes (4); and the closely associated need for the development and redesign of automatic time-temperature controls adapted to the demand of newer processes for quick response.

In addition, the New York State Department of Health recently compiled data to explain the causes for underpasteurization, which had been averaging 1.15 percent in New York State since 1949 (5). This department attributed the causes to (a) delegation of responsibility for pasteurization to unqualified relief operators, (b) change of management, (c) labor turnover, (d) moral and mental deficiencies of the operator, and (e) carelessness. Experience has shown that the human element may be considered the most important stumbling block to sanitary needs.

Nor should a casual statement to the effect that many more or less important intentional and unintentional violations of local, State, and Federal sanitary code regulations take

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place daily in many plants cause eyebrow raising among the initiated. In fact, considering the complexity of the modern pasteurizing process it would be surprising if such were not the case. From this standpoint, one cannot escape the strong suspicion that some potential outbreaks are avoided by the now common practice of overpasteurization.

Although there is considerable justification for holding management responsible for the proper operation of plants, health agencies cannot and should not miss the opportunity of promoting the spread of information as to the causes, nature, and prevention of prevalent diseases and the preservation and improvement of health. Certainly most will agree that relying solely on the punitive approach leaves much to be desired.

There is little doubt that existing defects in equipment and operation in milk plants may be attributed to some lack of training, education, and motivation. In an attempt to fill this need, the writer, with the cooperation of the health jurisdiction and milk dealers concerned, presented training programs in applied dairy and sanitary science to the plant owners, managers, operators, and personnel of Washtenaw County (March 13 to May 1, 1956) and Calhoun County (October 12 to November 16, 1956) in the State of Michigan. The 6-week course in Calhoun County was essentially the same as the Washtenaw County 8-week course with the exception of minor details.

Our experience, tailored to suit particular needs, may serve as a guide for other control agencies and dealers interested in the cooperative development of similar courses.

Preliminary Actions

At the initial meeting, the milk dealers were represented by owners and managers and the local health department by the public health engineer, educator, and sanitarians. We decided to hold the meetings each Tuesday evening at the Ann Arbor and Marshall Court Houses from 7:30 to 9:30 p. m. for 8 and 6 weeks. All plant personnel were invited to attend on a voluntary basis since they would be contributing their own time. The dealers agreed to bear the bulk of the expense. The

course was designated "Applied Sanitary and Dairy Science," the term "dairy" being used to indicate that the instruction would not be confined to sanitation.

A public health educator was assigned the task of publicizing the program by means of newspaper, radio, and television. The dealers reacted favorably to this aspect of the program, believing it demonstrated the dealer's concern for the consumer's welfare.

Objectives of the Course

Main objectives of the course encompassed the following:

1. To familiarize the trainees with the properties of milk and milk products and the various environmental hazards that may affect quality and safety during the production, processing, storage, and transportation stages.

2. To interpret for the participants the intent and applications of sanitary regulations as exemplified by the Ordinance and Code of the Public Health Service.

3. To inculcate in the trainee desirable mental habits relating to contamination potential of product, equipment and operation, product quality and safety, cleaning and sanitization, plant layout and product flow, and liability and responsibility.

A list of the subjects presented in the course is given on page 56.

The necessary motivation was supplied by continually pinpointing the relationship between quality and economics.

Presentation of Subject Matter

Throughout all sessions it was of utmost importance to present the subject material effectively and to establish the critical awareness desired. All the material is amenable to an interesting approach if properly planned, prepared, and executed. The use of visual aids prepared by the instructor plus judicious selection of available aids helped enormously in making the program a success. For these reasons a few of the devices developed and used will be described. To help attain and maintain a high level of interest, many references to experiences were made, some of a humorous, many of a practical, nature.

General subjects presented during the training sessions

Basic fundamentals

Science of milk production
Nutritive properties
Microbiology Disease and quality
Performance and quality

Receiving of milk

Deck tests Receiving equipment
Clarifiers Filters Separators Milk waste
Milk transportation Bulk tanks

Heaters and coolers

Exchange equipment Homogenizers
Pasteurizing equipment Pumps
Bottle fillers and cappers
Temperature and time controllers
Construction, design, and operation
Inspection and maintenance

Sanitizing equipment

Bottles, cans, and equipment
Bottle and can washers
Water, detergents, and sanitizers
Tests for determining efficiency

Sanitary quality control

Laboratory tests Trouble shooting

Defects in market milk and cream

Causes Solutions Routemen and quality

Plant layout, design, and utilization

Product flow
Building and building facilities

Legal aspects for the dealer

Liabilities Responsibilities

[Detailed descriptions of course content and the methods and materials used may be obtained upon request from the author. An instructor's guide containing lecture notes and use of materials is in preparation.]

At the start of the first session, a bottle of milk was placed on the table in front of the instructor. After remarking on the simple appearance of the liquid and how easily it could be simulated by suspending some bolt chalk in water, he projected on the screen a chart showing in detail the components of milk. This action served as a dramatic means of impressing the audience with the great complexity of the product they worked with daily.

A nontechnical movie, *The Science of Milk Production*, sponsored by the Purina Company of St. Louis and made in cooperation with the University of Minnesota, was then shown clearly illustrating how the cow makes milk. The motion picture was very effective and maintained maximum interest throughout its presentation.

One of the main aims of the training program was to make the trainee "contamination conscious." A series of placards was especially prepared to fulfill this course requirement. The placards described and illustrated the intimate life of a microbe, the decomposition of an apple, and the decomposition of a dead cat (6).

In the first of these, pertinent references were made to the ubiquitousness of microbes, their never ceasing activities, the absence of a tem-

perature regulatory system illustrating an important fact which makes refrigeration possible, the factors limiting growth, their small size, enormous numbers, amazing appetites, astonishing variety of diets, rapid multiplication under favorable conditions, and finally the fortunate fact that the majority of micro-organisms are not only innocuous to humans but are actually helpful and necessary.

The sequence on the decomposition of an apple traced the organic breakdown of an apple from the moment it falls from a tree to its ultimate decomposition by soil bacteria.

The last sequence, the decomposition of a dead animal, detailed in nontechnical terms the decay and final disintegration of the animal body.

Petri dishes containing sterile nutrient agar were then passed around, and the trainees were asked to talk, expectorate, sneeze, and cough over the exposed medium. One participant was asked to draw his finger over the surface of the agar and another to place a hair on the surface. Following incubation the resulting cultures were projected on a screen and discussed.

At this point it can be stated without equivocation that the trainees had been made, in varying degrees, "contamination conscious." A few

judicious and qualifying remarks avoided establishing a microbiophobic turn of mind. Ever present was the temptation for the instructor to go overboard in making a point and thus do more harm than good. The other procedures used to obtain the desired mental habits were presented in a similar manner.

Public Health Service slides (7) and motion pictures (8), illustrating lecture material, emphasized construction, design, and operation in nontechnical terms.

The subject of sanitary quality was explored by demonstrating the tests commonly used to measure quality, together with interpretation of results. Methods of overcoming causes of unsatisfactory results were discussed in detail.

At the conclusion of this session a chart containing, anonymously, the yearly performance data of each participating dealer was projected on the screen. By this means, it could be effectively demonstrated that unsatisfactory results could be overcome by efficient performance.

The demonstrative method was used almost exclusively during the washing and sanitizing session which included a discussion of the advantages and defects of common methods.

The plant session covered building, lighting, ventilation, product flow, and many other aspects that tend to make the plant more efficient and economical to operate. Examples were given of legal implications, and the responsibility of the dealer to consumers was stressed.

The session on defects in market milk and cream covered causes and means of overcoming the defects. Concrete and factual examples explained sanitary code regulations.

At the last session of the program a succinct summary touched on the major points of the course, with some emphasis on the economic phases.

Audience Reaction

Previous experience had indicated that dealers would be hesitant to ask questions during the question period held at the conclusion of each session, believing that such an action might reveal vulnerabilities to competitors. For this reason, a question box was used for depositing unsigned questions which were discussed at the following session. Another means employed

was the use of a health department representative to ask leading questions.

From observations made throughout the program, and from those obtained at the conclusion of the course from an interview with the participants, the following information was elicited:

- Dealer reaction was very favorable.
- Most of the plant personnel attended all of the sessions. This was as gratifying as it was surprising especially in view of the voluntary attendance arrangements. As a consequence the audience as a whole gained a general knowledge of the contents of the course while the specialized crews benefited from the specific instruction directed to them.
- The session on defects in market milk and cream was the most popular, a reflection of one of the main interests of the dealers. Since quality and safety are closely related, this attitude cannot be considered a drawback to the main objective of the program.
- There were strong indications that desired mental habits were instilled in the trainees.

Requests to present the program in other jurisdictions indicated that there is a market for these programs. It should be thoroughly exploited because of obviously inherent rewards. Qualified instructors for such programs are available in each health department and institution of learning.

Finally, it is considered wise to reemphasize that one of the most important prerequisites for success in the presentation of these programs is to make a continual bid for interest. This can only be accomplished by a vast amount of time, thought, effort, and initiative in planning, preparation, and presentation. Ingenuity will help considerably. The rewards, however, make it all worth while.

Critique

It may be felt that the subject matter presented within the allotted time was too extensive and intensive for maximum effectiveness, but our chief objective was to determine the need, value, and reception by industry of the training course. The general complexity of the subjects makes it mandatory to present them over periods consistent with the attainment of maximum effectiveness. Any jurisdiction presenting these programs that finds the suggested

course lengths unsuitable may adjust the time factor to its particular needs.

An important consideration for evaluative purposes is the fact that one such program is not sufficient to the needs of the participants. Milk technology is in a dynamic state and progress is being made daily in all its phases. Progress should by all means be communicated to the industry, and the most satisfactory means of accomplishing this is by the routine and continual offering of training programs, properly spaced so as to accommodate new material as it becomes available.

Accordingly, these programs should result in material gain for the processor, and, in conjunction with its inspection and laboratory programs, the control agency should obtain benefits not otherwise realizable. The consumer, for whom all this work is done, would profit in the greater protection which this means of communication achieves.

Summary and Conclusion

Contrary to popular conception a challenge still exists in the dairy field and will persist for some time to come. New processes and new developments continue to evolve and with them new problems requiring solution.

Trial training courses were conducted for milk plant operators in Washtenaw and Calhoun Counties in Michigan to evaluate the need, value, and reception of such training. The course subjects ranged from basic fundamentals in milk processing to legal aspects for milk dealers.

The results indicated that such programs on a continuing, routine basis would definitely aid and be appreciated by the industry. The responsible agency and the public would profit in the greater likelihood of a high quality, safe product.

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